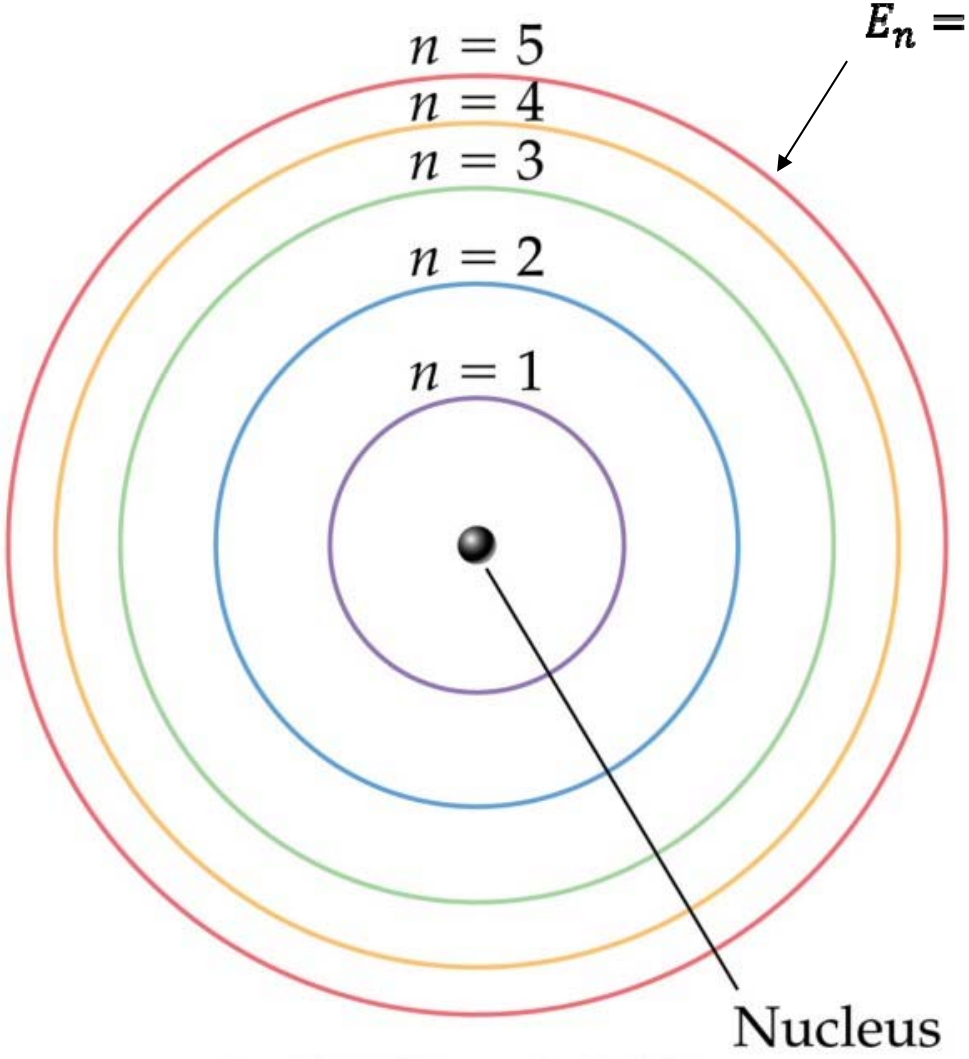
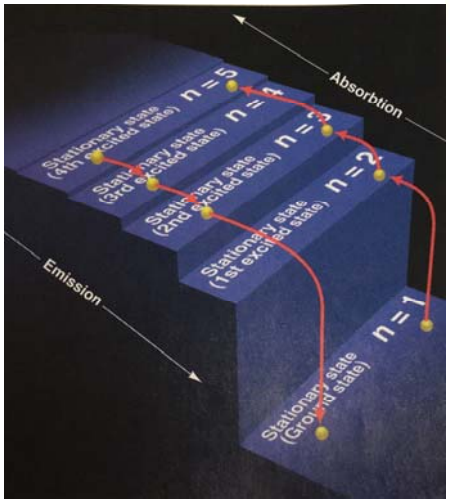
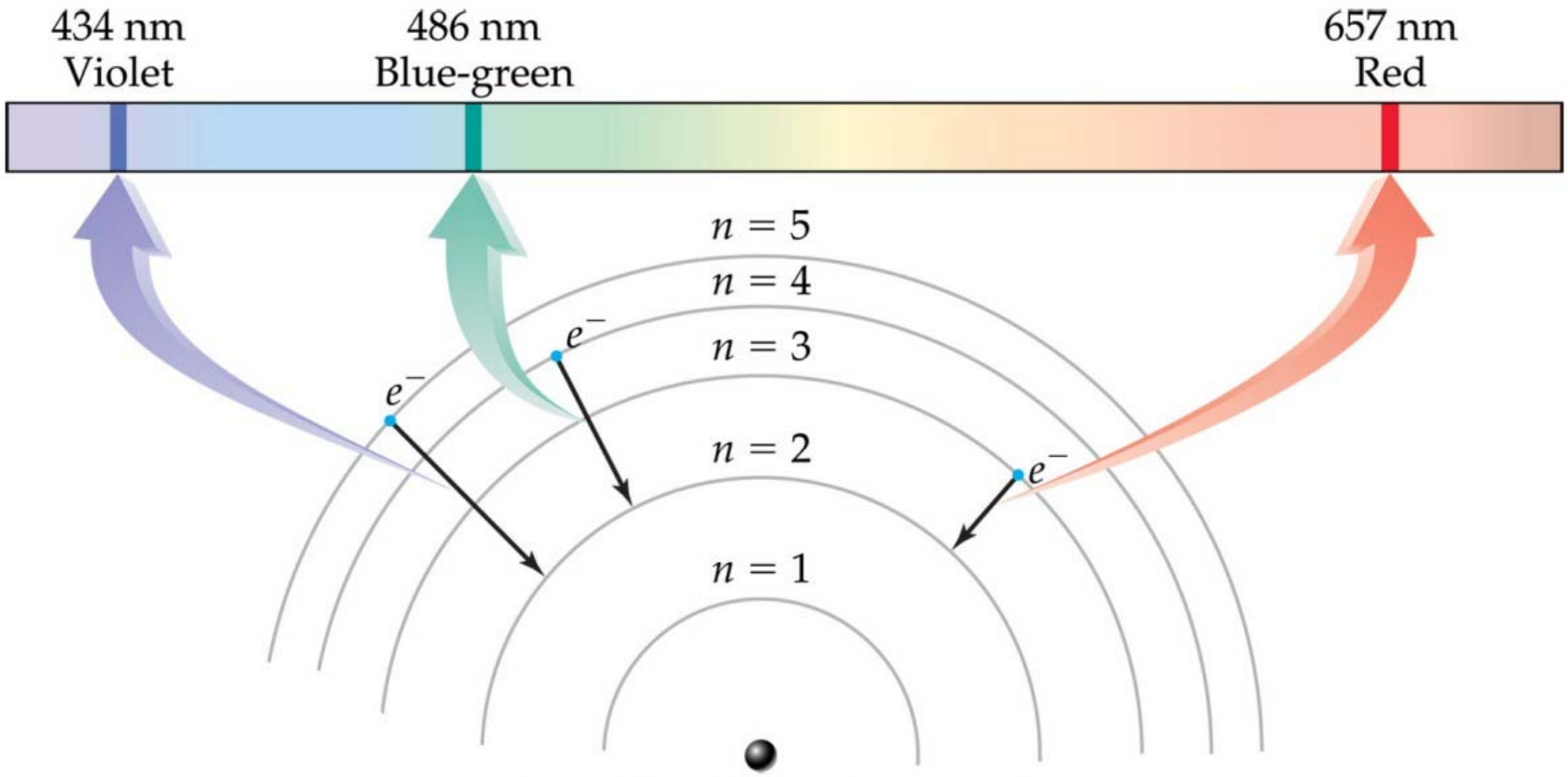
The Bohr Model of the Hydrogen Atom

$$E_n = -2.18 \times 10^{-18} J \left(\frac{1}{n^2}\right)$$

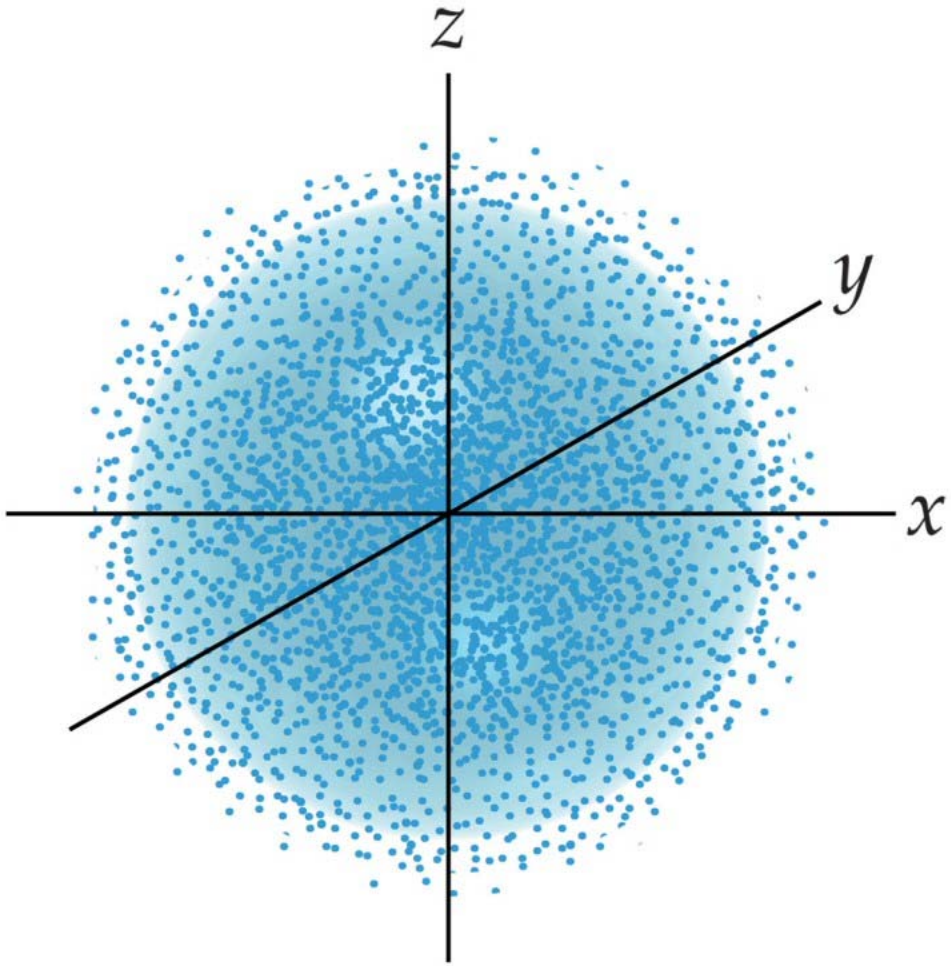




The Bohr Model of the Atom
Hydrogen Spectrum



Electron (Probability) Density Map

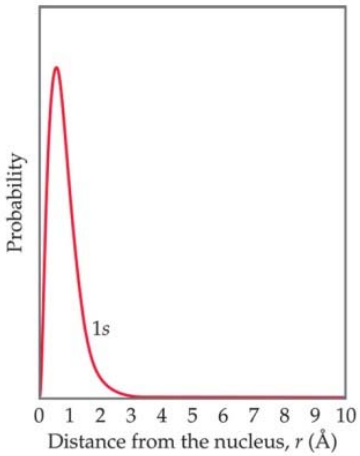


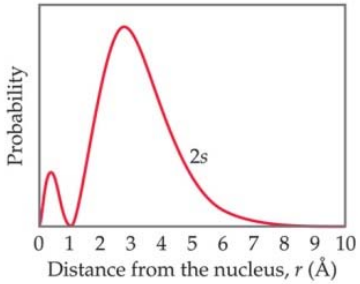
s Orbitals

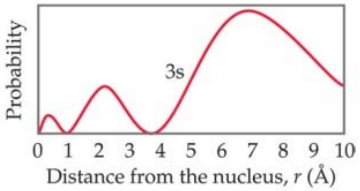
1*s*

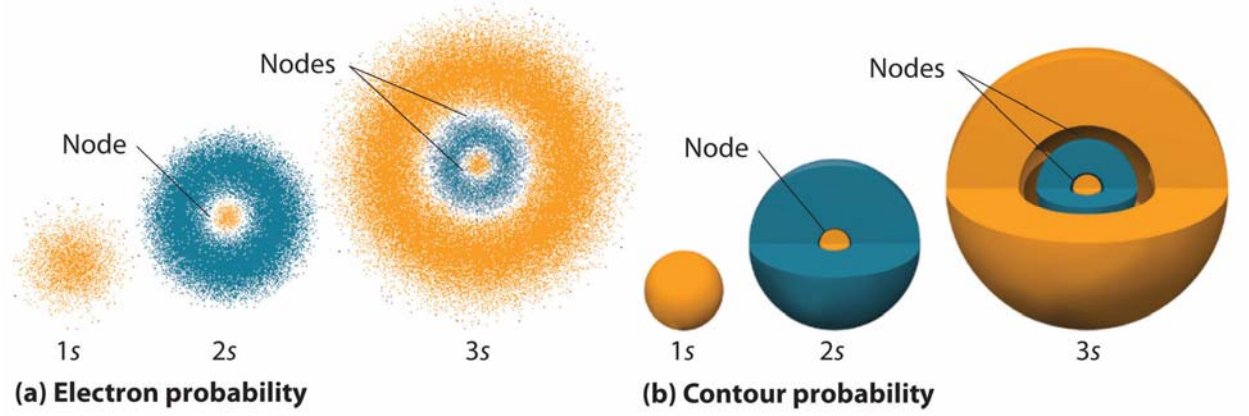
2*s*

3*s*

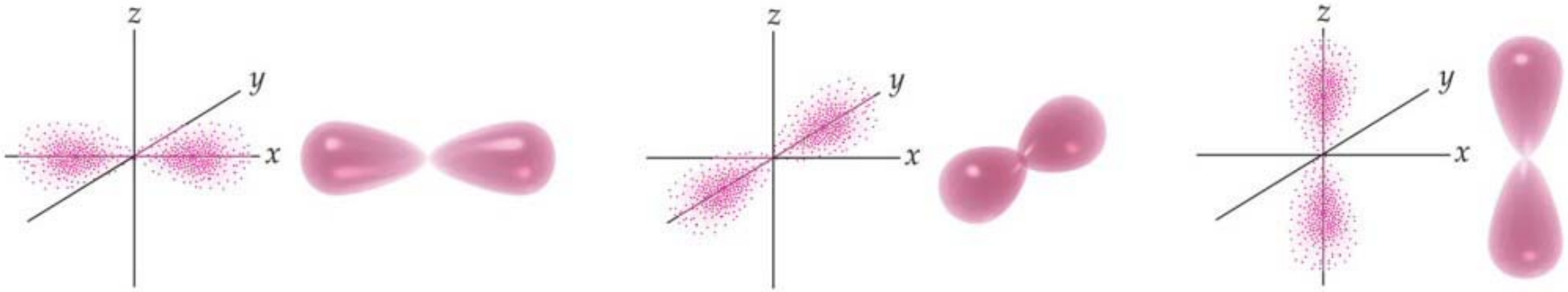






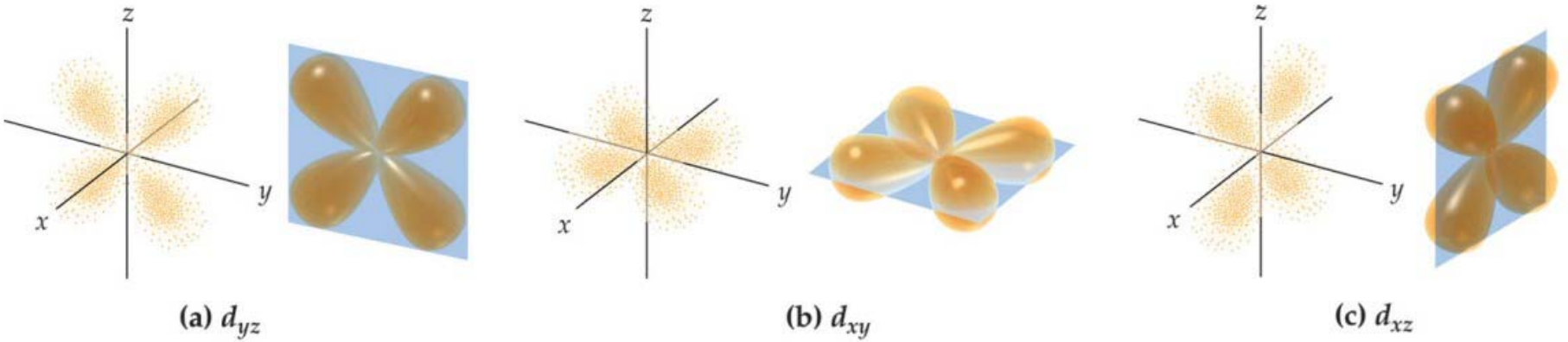


p Orbitals

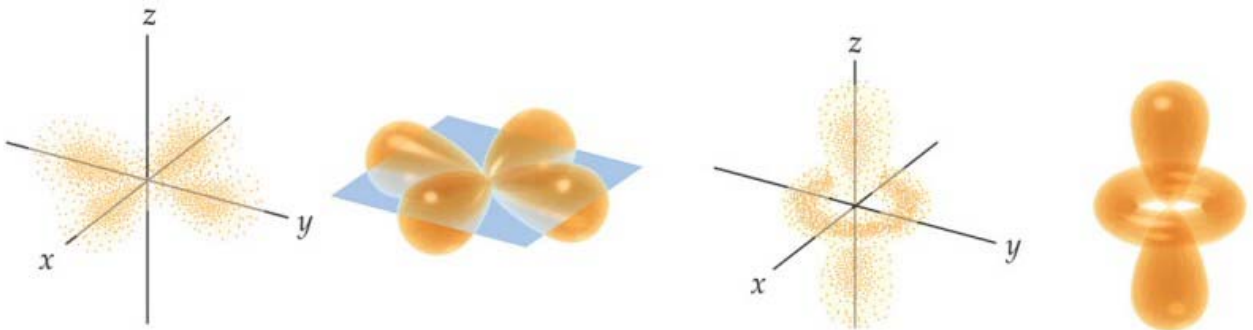


(a) p_x (b) p_y (c) p_z

d Orbitals

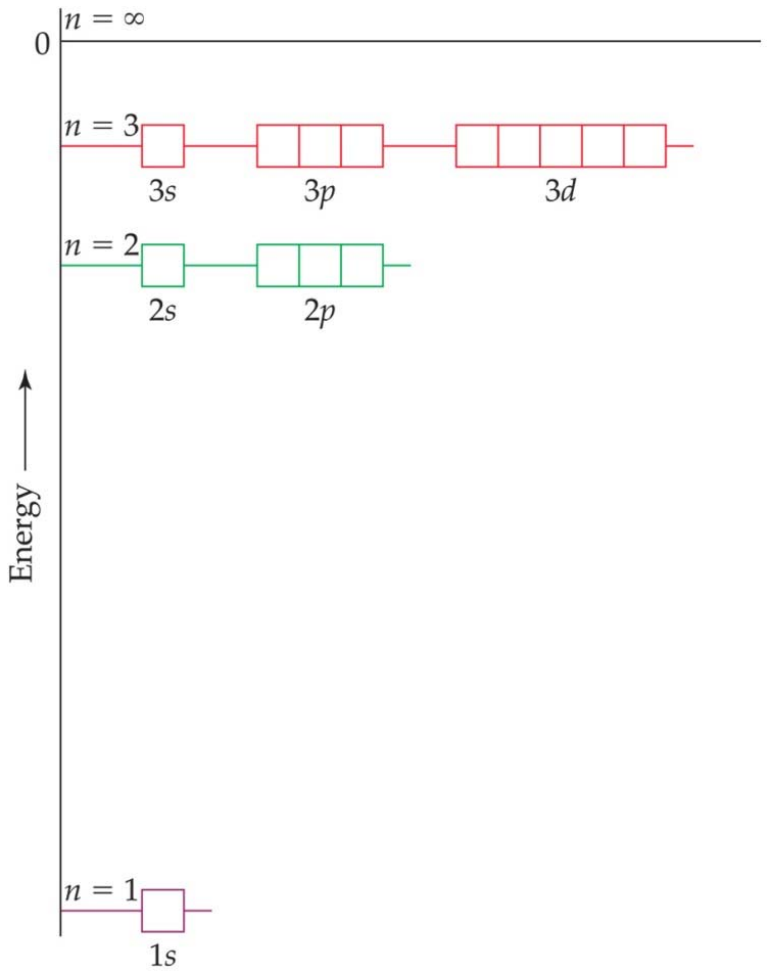


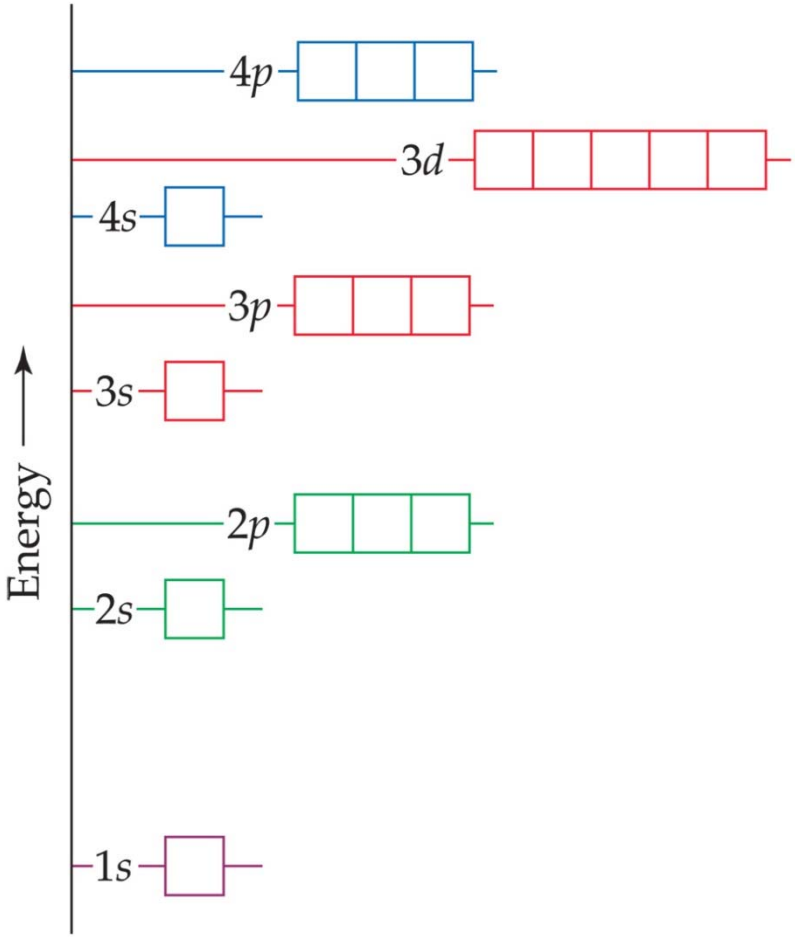
(a) d_{yz} (b) d_{xy} (c) d_{xz}



(d) $d_{x^2-y^2}$ (e) d_{z^2}

Orbital energy levels:
Hydrogen atom vs. Many-electron atoms

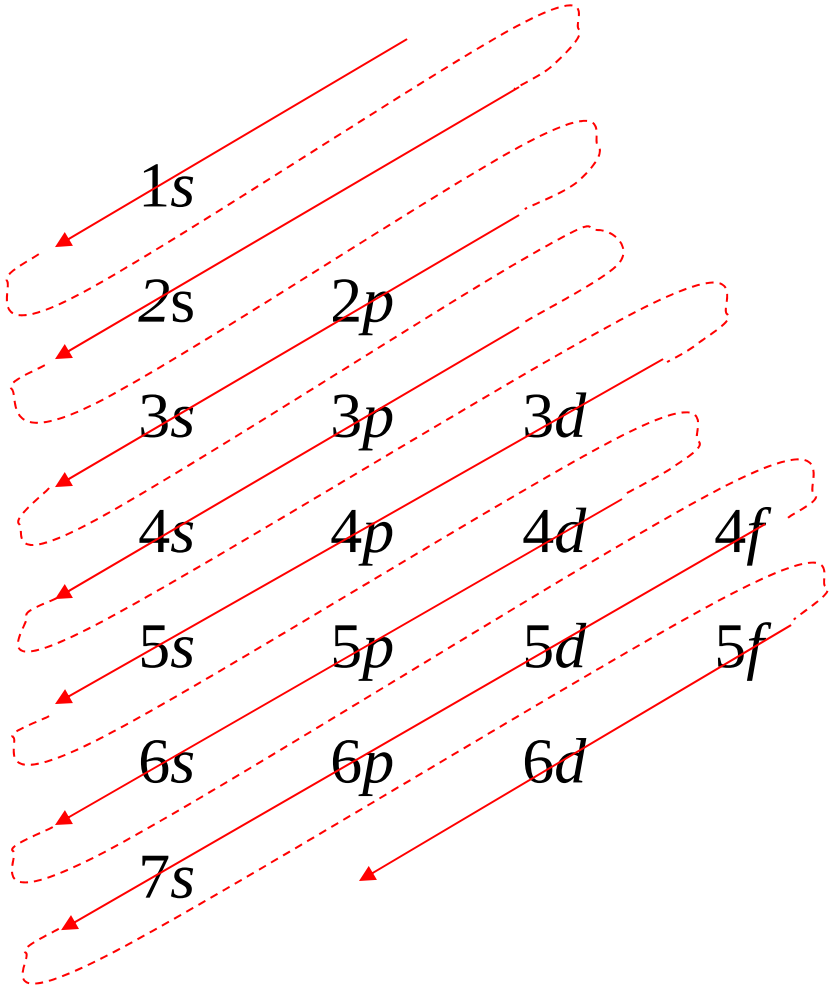




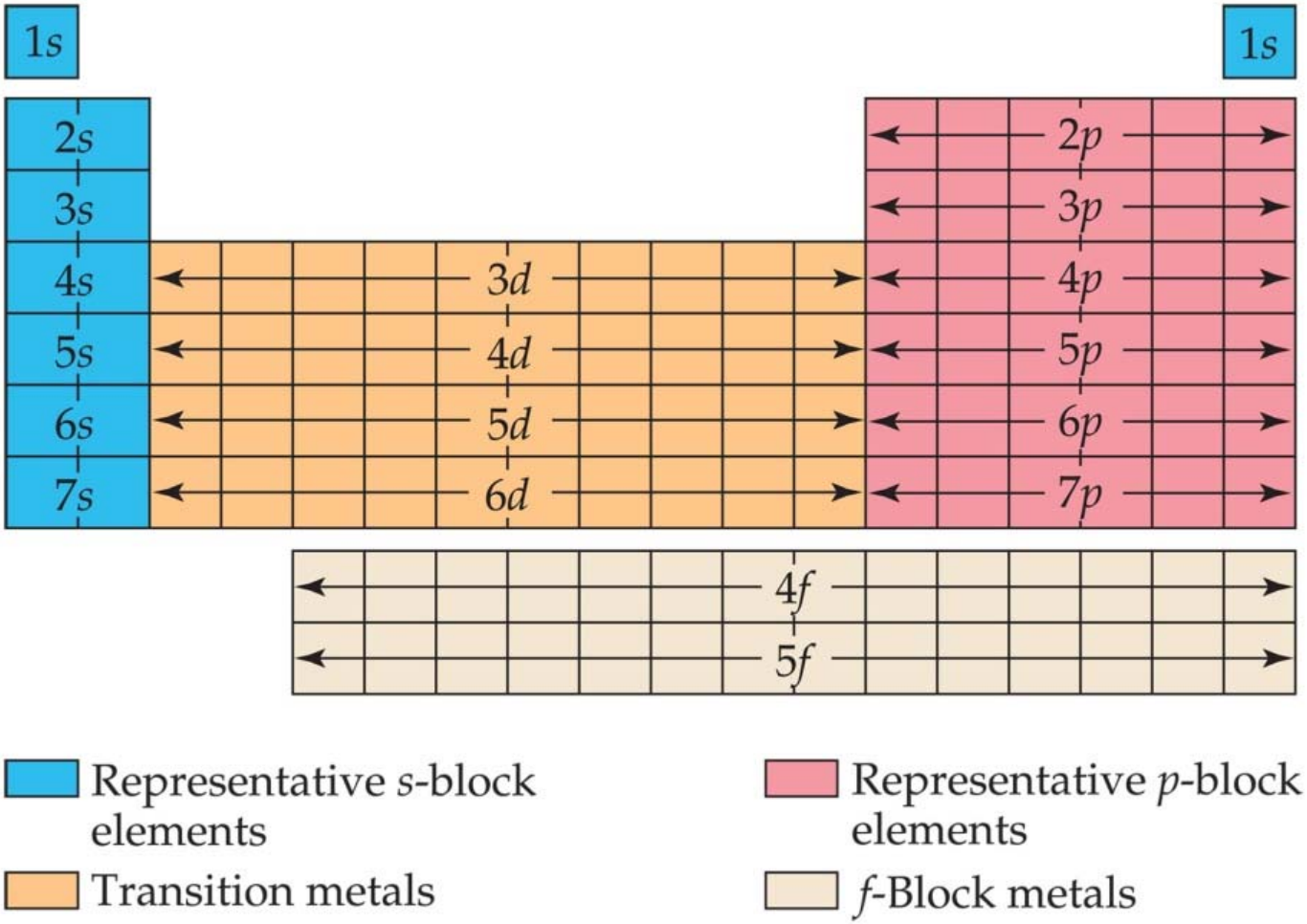
Order of Subshell Filling in Ground State Electron Configurations

Start by drawing a diagram putting each energy shell on a row and listing the subshells, (*s*, *p*, *d*, *f*), for that shell in order of energy, (left-to-right).

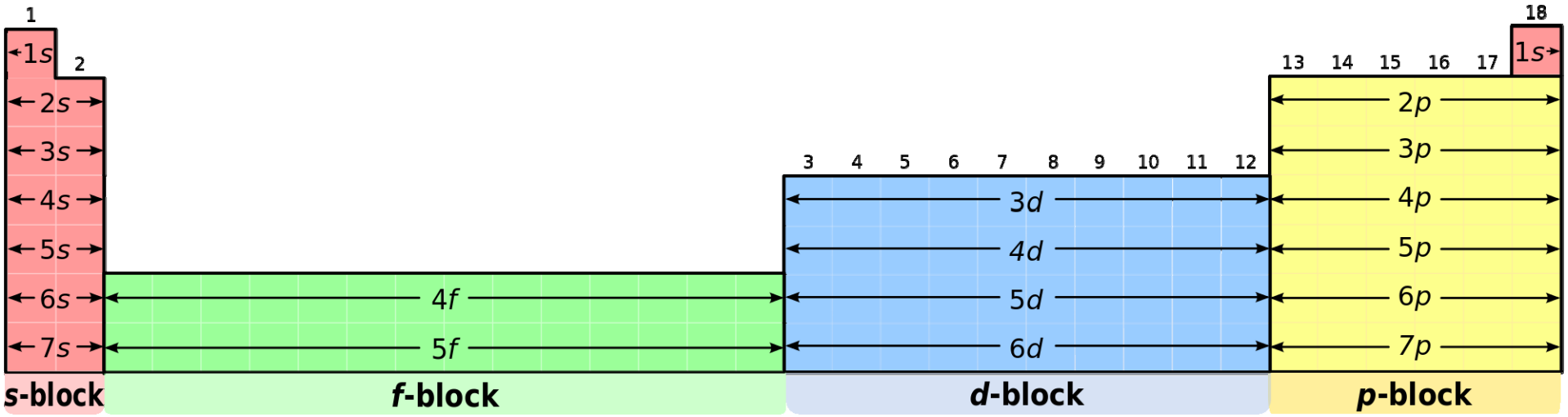
Next, draw arrows through the diagonals, looping back to the next diagonal each time.



Block Diagram of the Periodic Table



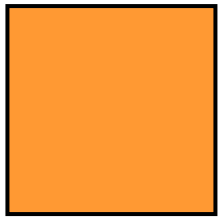
Block Diagram of the Periodic Table



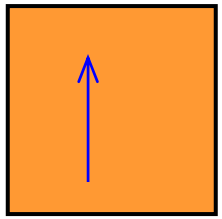
Orbital Diagrams

- We often represent an orbital as a square (or line) and the electrons in that orbital as arrows.

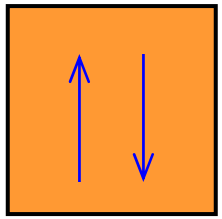
  - the direction of the arrow represents the spin of the electron.



unoccupied orbital

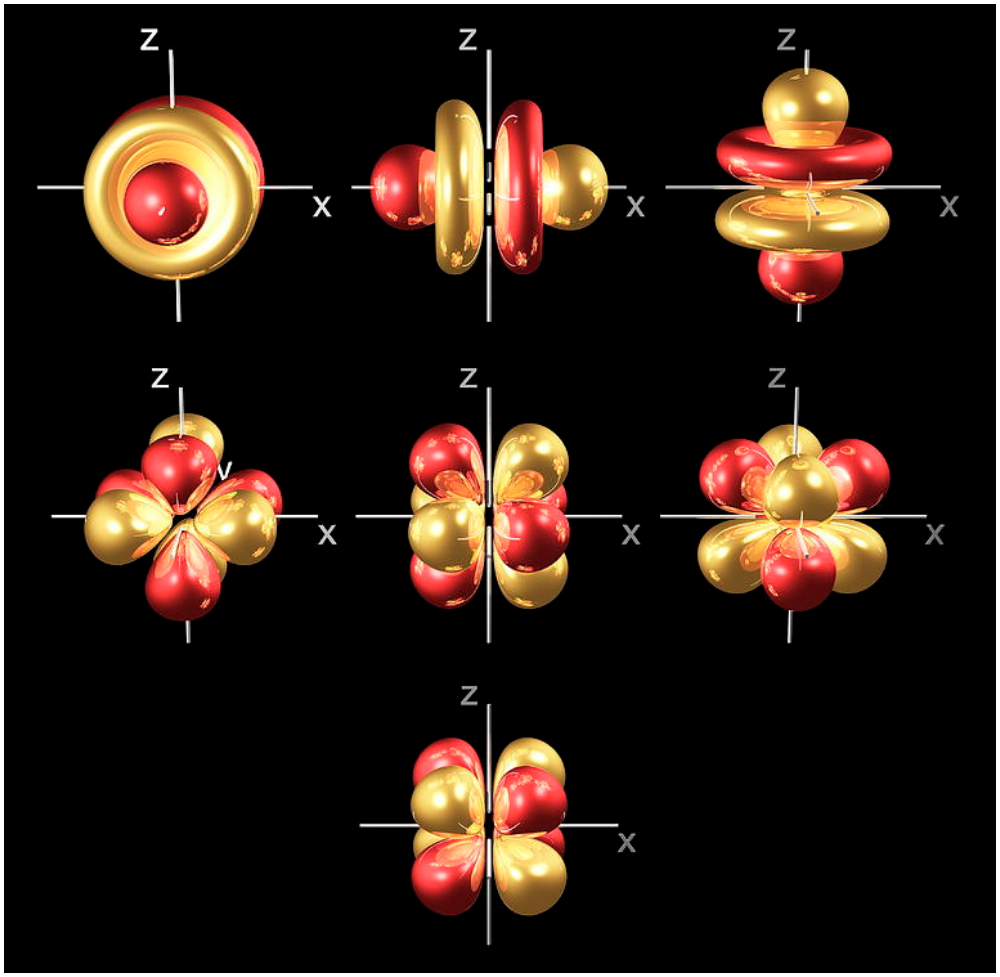


orbital with 1 electron



orbital with 2 electrons

f Orbitals



f_{y3} f_{x3} f_{z3}

$f_{z^2-y^2}$ $f_{z^2-x^2}$ $f_{x^2-y^2}$

f_{xyz}